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**Technology Transfer  
and Dissemination: A  
Contribution to the  
West Africa Regional  
Program Action Plan  
for the Initiative to End  
Hunger in Africa.**

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# 1. General Background

## 1.1 Background

Ten years ago, a survey conducted within the sub-region on the basic structure and orientation of extension practice would have found the majority of national extension programs to be using some variant of the Training and Visit (T&V) system promoted by the World Bank. These systems featured a highly centralized, top-down ‘cascade’ administrative structure, designed to maximize efficiency in moving new technological recommendations from research out to farmers through bi-weekly meetings with field agents (using demonstrations and contact groups), who in turn were supported by a small cadre of subject matter specialists and regular in-service training.<sup>1</sup> Ultimately, the high costs of operating these elaborate structures, combined with the lack of new technologies to extend, led to the eventual abandonment of the model. Although increasingly relegated to the realm of historical footnotes, the T&V experience continues to exert itself through the attitudinal and operational footprint it left upon individuals and programs indoctrinated in its use.

Today few, if any, of the classic T&V programs still operate within the sub-region. The extent of the fall from grace of the T&V model is remarkable for both its breadth and rapidity, and is based upon the combined effect of (i) the mutual recognition by the Bank and implementing countries of the operational shortcomings (or outright failures) of the T&V approach in West Africa, (ii) the shifting of the Bank and other donors to channeling increasingly large shares of operational funds through so-called non-governmental organizations (NGOs),<sup>2,3</sup> and (iii) based on both the weak performance of the T&V model and the withdrawal of financial support, governments have had to face ‘a day of reckoning’ over what type and size of programs they can support through their own resources, and in response, national programs have begun to gravitate towards alternative methodologies of extension practice and models financing.

Although few entirely new forms of extension service provision have emerged in recent years, there has been an important shifting and re-partitioning of activities among the existing actors. One of the most important trends across the sub-region has been the transfer of basic service provision, such as credit provision and input supply, out of national extension programs and into the private sector. This process began in the mid-1980s with the introduction of structural adjustment policies, and has accelerated through the 1990s. Interestingly, and contrary to the trend among national programs, a surprising number of donor-supported NGOs, large and small, are promoting their own credit schemes and arranging for input delivery. Seed multiplication and dissemination is perhaps the remaining major service area that has remained primarily under public sector control, due largely to the nature of the product and the weak potential for private sector enterprise to profitably provide the

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<sup>1</sup> A complete description of the T&V model can be found in Benor and Baxter (1984).

<sup>2</sup> Although an implicit assumption surrounds what is meant by NGO, in reality there is little agreement; many organizational types are found, and no agreed upon typology has yet been established (e.g., White and Eicher, 1999; Uphoff, 1996).

<sup>3</sup> Eicher and White (1999) report that: 34% of USAID’s budget went to NGOs in 1994 and was expected to increase significantly; the World Bank’s funding of NGOs rose from 6% in 1988 to 53% in 1994; and DFID channeling of resources through NGOs increased 400% between 1984 and 1994 (source: ODI, 1995).

service. In terms of their overall content, it is fair to characterize public sector extension programs, as well as most NGOs, as providing public goods (largely in the form of technical advice and recommendations) to farmers across the majority of, but not all, environmental and socio-economic conditions found within each country's borders. In contrast, private sector service providers, and quasi-governmental parastatal organizations, tend to be oriented towards the provision of private goods and services within much more limited geographic and economic domains.

Although the perfunctory characterization of governmental extension program performance as slow, ineffective and grossly inefficient in comparison to NGOs has become standard, the on-the-ground reality is not so clear-cut. Freed from the operational bondage imposed by the T&V system, and armed with cutting-edge approaches and more responsive management styles, national programs are proving to be equally capable of delivering the same types of benefits as NGOs (at the same, or even lower, costs). In addition, due to their large size, national programs are able to generate impact at a speed and scale that are orders of magnitude beyond that possible for most NGOs. Poor infrastructure and policy constraints continue to limit the impact of market forces and the private sector in many countries in providing clearly superior alternatives. In general, African farmers face some of the highest transaction costs in integrating themselves in the marketplace, paying 3 to 5 times the world market prices for inputs, while receiving only a fraction of market value for their produce (AICHA, 2002). While the provision of certain goods and services (e.g., veterinary services) is finding a ready home in market-based transactions, others have not (e.g., seed supply), and may never be fully absorbed by private enterprise. In general, the low educational levels of extension field staff and supervisors, and limited sources of new, viable, technological innovations affect all technology diffusion efforts alike, regardless of the type – public, private, or NGO.

## 1.1 Major Issues

As indicated in the introduction, a number of important issues warrant identification and further comment regarding their immediate and mid-term future impact on technology transfer and dissemination efforts in West Africa.<sup>4</sup>

The first concerns the general increased **plurality of extension service provision** that has occurred over the past decade. For recipient countries, one of the major fallouts from the waning support among donors for public sector institutions is the structural transformation of how, and by whom, extension services are provided. This is most clearly seen in the emergence of a truly pluralistic organizational landscape, where state extension agencies have had to learn to share the field with an increasingly large number of NGOs. To illustrate the point, in the case of Mali, over 1,800 NGOs are reportedly listed at the national registry office,<sup>5</sup> compared to the estimated 800 in 1992. While not all of these organizations carry out direct extension activities, many do. These range from one-person 'briefcase NGO' consultants, to large, principally northern-based, and often times well-funded,

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<sup>4</sup> Although often used interchangeably, the terms 'technology transfer' and 'dissemination' are used here, respectively, as they apply to the movement of a technology, management practice or methodology across contexts (inter-regional, inter-national, and inter-organizational), and the subsequent diffusion of a new practice among potential end-users. The adoption (or non-adoption) of a new technology is viewed as a related but separate event, resulting from the internal benefit-cost assessment made by individual enterprise managers once a new alternative is made available.

<sup>5</sup> Personal communication from the *Comité de Coordination des Actions des ONG au Mali* (CCA-ONG), Bamako, Mali.

organizations that rival and may even exceed the national programs in terms of budget and operational prowess. Despite this trend towards diversification, the fact remains that in most countries within the sub-region, state extension services remain the largest, and single-most important organization engaged in technology dissemination. The reason Guinea, for example, has been able to successfully launch and sustain a massive effort to rapidly multiply and disseminate NERICA rice varieties (NEw RICE for Africa), developed by WARDA (WARDA, 2001), is because they have over 2,000 agents in the field. Similar figures can be cited from neighboring Cote d'Ivoire and Ghana. Compared to the one or two hundred field personnel of the very largest NGOs, and the more typical number of 6 to 7<sup>6</sup> field technicians, the potential and real power of public extension services must not be under-valued.

As would be expected, under conditions of appropriate public policies, adequate infrastructure and sufficient effective consumer demand, the private sector has been successful in providing a wide range of production inputs (including, in some contexts, the emergence of private seed companies), certain discrete technical services (such as veterinary), as well as various production credit opportunities, particularly in situations where farmers have achieved higher levels of market integration through cash crop production. The provision of 'public good'-type services, however, such as technical advice on crop production techniques, natural resource management, small enterprise development and others, has not been an area of growth, although Mali is currently experimenting with a limited program (Bingen and Dembèlé, n.d.). Nor has the public sector done particularly well in situations where the farm population is dispersed and generally poor. In response, one observer has wondered where the rich body of experience is located that shows farmers living on 1-2 dollars a day "have bought their way out of poverty" (Eicher, 2001: 14). Others have raised questions over the willingness of the private sector to invest in staff training, and how effective for-profit enterprises will be linking with governmental research institutions, among other issues.

The examples of voluntary technology dissemination emanating from certain group-based development efforts, and the increased political advocacy of established farmer unions, fed hopes through the 1990s for the potential involvement of producer associations in technology dissemination activities. The record of evidence to-date, however, shows that these hopes have not been, and may never be, answered. While most associations readily become involved in taking on greater responsibility for input provision and the bulk marketing of members' produce (as a means of reducing costs and gaining more revenue for their members), there has been little or no involvement in actual technology diffusion activities. Nor does this appear likely to change in the foreseeable future.

A second, closely related and equally important issue is that of the significant changes that have taken place in the **methodological orientation** of extension practice over the past 10-15 years. For governmental extension services, the operational void created by the abandonment of the T&V model has generally been filled by a loosely defined set of 'participatory practices,' generally reflecting national extension programs' struggle to assimilate the language and practices of more participatory and multi-actor orientations to technology dissemination that have characterized the work of their smaller NGO cousins.

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<sup>6</sup> A recent survey of 216 major NGOs working in agricultural and natural resources management in the nine CILSS-member countries found on average 12, with a median of 6, staff members working on technical issues.

One of the primary reasons why NGOs have captured the imaginations of donor organizations and have been so successful in mobilizing funds is the perceived notion of NGOs' superior effectiveness and efficiency in meeting the needs of target populations through their streamlined, more flexible approaches to programming and use of innovative, responsive, participatory methodologies. The general shift by NGOs to a more process-oriented, demand-driven style of rural development often involves related adult education, local organizational capacity-building and empowerment themes, most of which were lacking in the contemporary governmental programs of the day.<sup>7</sup>

As one recent review indicates, however, the optimism of the pro-NGO view is founded more on belief (desire) than empirical evidence (White and Eicher, 1999). The factual body of evidence supporting the picture of NGOs' superiority rests largely on anecdotal glimpses and isolated case studies. Yet an equally persuasive body of anecdotal material and case examples can be compiled showing just the opposite -- that many NGOs may, in fact, be no more effective, even less efficient, and perhaps no more operationally innovative or participatory than the governmental services they are supposedly superior to. Within this atmosphere of uncertainty, one issue is resoundingly clear: given the sheer number of organizations involved, their diverse ideological orientations, unequal resources, disparate levels of trained human resources etc., the resulting challenge of attempting to coordinate or undertake any sort of broad-based, complementary programmatic activities have, in many countries, become prohibitively complex. Underlying this observation, and in contrast to what is known about past governmental programs, it is clear how very little we know about NGOs -- what they do, where they work, who they target and how they locate new innovations. Given the large portion of financing currently being channeled through NGOs, this basic lack of understanding, and continued 'blind faith' in their support, is troubling to say the least.

A third area of concern, affecting equally governmental services, parastatals, NGOs and, presumably the yet-to-emerge cadre of private sector extension employees, is the low **educational levels** of the majority of extension field staff and managers. The rising demands associated with new extension methodologies, and the need to coordinate activities of numerous partner organizations, require field agents and their supervisors to increasingly act as process facilitators, learner-driven adult educators, multi-actor networkers, as well as to assume more prominent roles in up-stream technology development and adaptation efforts (e.g. Neuchâtel Group, 1999). The skill requirements demanded by these activities lay well beyond the educational preparedness of the vast majority of field agents. The one-off, in-service training 'workshops' on 'new' extension methodologies that became one of the cottage industries of the development enterprise in the 1990s are simply not sufficient to overcome the more basic lack of a sound educational background. Furthermore, and perhaps most troubling of all, an assessment of available educational programs within the sub-region that are capable of meeting the professional demands of the new extension realities would likely come up with only one or two notable candidates (e.g. AEDA, 2000; Zinnah et al. 1998), -- a sobering reminder of the massive failure on the part of donors in taking seriously the need for long-term, institution-building investments within the sub-region. The important exceptions of the tertiary education program for mid-career extension agents at the University of Cape Coast, Ghana (e.g. Zinnah and Naibakelao, 1999), and the launching of a similar program through the University of Mali, deserve to be closely studied by other countries and donors. In general, however, the level of

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<sup>7</sup> A review of development history, however, will show that many of these issues have played central roles in earlier strategies of development interventions.

dis-connect between the existing education-research-extension programs,<sup>8</sup> and the inability of most countries to offer adequate training opportunities for their own scientific and extension professionals, underlies the question of how countries in West Africa will rise to the challenge of driving an autonomous economic development agenda.

One of the perennial ‘thorns’ in the side of nearly every extension program is the limited base of innovation and struggle to find relevant new technologies. One of the persistent complaints levied against national extension programs over the past 20 years has been over their dogged promotion of the same, tired, old technical messages. Where NGOs have shown their superiority has often been through their linkages to, or mobilization of, alternative sources of technical information. Although not a direct relationship, the growing plurality of organizations involved in technology diffusion has tended to result in a growing (though still limited) plurality of technology sources. While on the surface would seem a positive trend, due to the divided, often highly antagonistic, nature of GO-NGO relations, these two levels of diversification – innovation source, and vehicle of dissemination -- have tended to assume and retain stronger lines of vertical integration rather than expanded networks of horizontal exchanges. Governmental extension programs tend to get most, if not all, of their ‘technology choices’ from governmental research programs, while bi-lateral and multilateral funded-projects, as well as large, northern-based NGOs, tend to utilize and promote their own technical innovations (a common pattern for smaller NGOs is to serve as implementation vehicles of donor specified activities, which often come with their own technical assistance components). Only in those cases where some degree of true inter-organizational collaboration has been established (typically in the context of a specific funding initiative) has there been a real broadening in the pool of innovations sources available to all participating diffusion organizations. The socio-political climate for these types of inter-organizational collaboration varies markedly from country to country, and often from program manager to program manager.

In addition to the struggle to find current, new information, one of the sad truths of agricultural research and technology development is that, outside of the established gene banks, there are often no national, let alone sub-regional or regional, repositories of accumulated wisdom where farmers, extension services, NGOs or others can access a comprehensive range of technological options. Burdened by staff turnover and major policy shifts, individual research organizations tend to operate within their own experiential sphere of current activities, which represent neither the breadth nor historical depth of developments within their own organizations and countries, let alone the larger regional and global environment. Throughout their development, African universities have generally been side-line spectators to the research process, and only now are beginning to receive the attention they deserve in increasing their involvement in research activities (e.g. Michelsen et al., 2003). Set against the backdrop of the long time delays in technology development (few breeding programs, for example, have anything significant to offer in less than a decade), and the truly difficult nature of problems facing research organizations, any potential loss in opportunities due to the inhibited movement of existing technologies should be a major area of concern. The bottom line is that without the basic availability and occasional addition of new, responsive, technical alternatives, any diffusion program -- public, private or non-profit -- will have little to offer their audiences.

Alternative approaches to **extension financing**, intermingled with the related topics of operational structure, need for increased market orientation, investment in human resource development etc., are

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<sup>8</sup> The related issue of getting African Universities more involved in agricultural research is only now gaining the attention it deserves (e.g. Michelsen et al., 2003).

currently a lightning rod of debate among donors and development scholars focusing on extension issues, and more importantly governmental extension programs as well.

To illustrate the point, the four neighboring countries of Côte d'Ivoire, Ghana, Guinea and Mali have all abandoned their previous T&V-based approaches to extension programming, and are all now pursuing self-described participatory approaches to extension through various mechanisms: Côte d'Ivoire (before the outbreak of violence) through a system of contractual arrangements between line-Ministries and the national extension service for the delivery of specific extension programs; Ghana through its program of national decentralization, which allows for additional district level buy-in to extension programming options (currently focused on expanding the Farmer Field School program); Mali through the increased privatization of services, including experimentation with a limited user-pay program, offered through the traditional regional and commodity-oriented quasi-governmental organizations; and Guinea through the continuation of a fairly traditional, centrally financed and managed mainline national extension service. Although currently most of these programs receive significant levels of direct and in-direct donor support, financing is intended to devolve entirely to state resources in the future.

Due to the need to fit alternative models of extension financing to the unique national policy orientations, levels of market integration of specific target groups and production systems, and other significant historical, institutional and current contextualizing factors, it is not likely that any one model will emerge for widespread adaptation (in fact the experiences of blindly promoting the same T&V model, irrespective of context, would argue strongly against such a notion). Researchers concentrating on the issues have developed typologies differentiating between alternative approaches based upon the source of financing (public or private) and means of service delivery (public or private), although within these broad parameters a great deal of variation exists (Christoplos et al., 2000; Rivera et al., 2000; SDC, 2001a, b). The current experiments occurring within the sub-region, as well as those from elsewhere on the continent, and beyond, deserve to be closely monitored for the lessons they provide in terms of which of the various financing mechanisms can be best fitted to specific sets of country-level conditions, and how.

## **1.2 Major Approaches & Lessons Learned**

Due to their underlying differences (dissemination within, as opposed to transfer across geographic and organizational contexts), it is easiest to address issues related to dissemination and technology transfer separately, although in operational terms most organizations are involved in both types of activities.

### **1.2.1 Dissemination**

The widespread diffusion of the language and practice of participatory development has been one of the major changes to extension practice occurring worldwide over the past 20 years. Within the sub-region most of this growth in popularity has occurred in the form of a diffuse body of non-unified 'participatory' techniques and discrete methodologies, although at least one major operational approach is gaining significant exposure. Data from a nine-country survey of 216 NGOs involved in agricultural and NRM technology diffusion in West Africa indicates that some of the most important examples of participatory methodologies include:



- a. Rapid Rural Appraisal/Participatory Rural Appraisal (RRA/PRA). Introduced through short-term, in-service training or standalone workshops starting in the late 1980s, these approaches have become the 'bread-and-butter' tools of most NGO field activities, and it can probably be safely said that at least an awareness of their general form is now well established within virtually all dissemination organizations across the sub-region. The widespread use of RRA/PRA approaches, however, does not mean that the level of quality, or even observance of the basic principles, is always high;
- b. Participatory Varietal Selection (PVS). An approach initially targeted at assisting breeders in understanding farmer preference, PVS has since increasingly been used by extension programs to identify and disseminate locally desired varieties. The West Africa Rice Development Association (WARDA) spear-headed promotion of PVS application through a multi-year annual training and small grants program, which trained a small core of rice breeders and social scientist researchers in every NARS across the sub-region. Use of the approach has since spread through joint field activities, exposure through 'field days'-type demonstrations and various publications;
- c. Community-Based Seed Systems (CBSS). As a refinement of NGO and FAO decentralized seed multiplication programs of the late 1980s and early 1990s, the CBSS model involves individual farmers and farmer groups in the commercial multiplication and sale of new crop varieties, cutting up to 5 years off the time it takes new varieties to reach farmers. Through the assistance of WARDA scientists, national-level programs have been established in Guinea and Côte d'Ivoire, with other countries considering implementation plans. A wide number of NGOs are using the same or similar approaches in most countries in the sub-region;
- d. Community-Based Natural Resource Management (CBNRM). Introduced through a broad range of efforts (e.g. FAO, NGOs and bi-lateral assistance), CBNRM is perhaps most closely associated with forest management issues, due to a number of well-researched case studies and a period of popularity in establishing community woodlots in the early 1990s. Nevertheless, the CBNRM approach has been successfully used within the sub-region in the management of soil fertility, grazing lands, water resources, fisheries and wildlife;
- e. Rural Radio. Although not identified in the recent survey, the rapid growth in the number and diversity of private radio enterprises in recent years (including broadcasting, satellite and internet connectivity) has stimulated interest in using the various mediums to accelerate the dissemination of information on new technologies to rural areas. Efforts are currently being spearheaded by ISNAR, FAO and CIDA, with active programs in several countries within the sub-region, notably Burkina Faso, Ghana and Mali (e.g. Hambly and Kassam, 2002).

In contrast to these individual participatory techniques used by many different governmental and NGO extension programs, the introduction and spread of the Farmer Field School model within the sub-region is unique, in that it constitutes a broader, more comprehensive strategy to extension practice itself. Introduced to West Africa from S.E. Asia in the mid-1990s, through assistance by the FAO Global IPM Facility, significant FFS programs have begun to develop in at least four countries (Ghana, Mali, Burkina Faso and Senegal), covering a range of production systems, from irrigated rice to rainfed cereals, cotton, plantains and vegetables. Involving the use of the principles and practice of adult education, farmer-led experimentation, farmer-to-farmer communication and local organizational development, the FFS model has embraced many of the core features of participatory development and local

empowerment. Although not without problems, the potentials offered by the FFS approach appear great, and are only now being explored (Simpson and Owens, 2002).

The lessons learned from these experiences are several. First, and perhaps most surprising, is the observation that given the opportunity and support, governmental extension agencies are every bit as capable of being leaders in the development, refinement and implementation of innovative new approaches to technology dissemination as NGOs (e.g. PVS, CBSS, FFS). Secondly, due to their size and established presence at the village-level, the involvement of national structures and larger NGOs have been critical in scaling-up the implementation of new practices, as in the case of the CBSS programs in Côte d'Ivoire and FFS in Ghana. It is important to observe, however, that the success of broad-based implementation is closely tied to the successful testing of new approaches in pilot projects and adaptation to local conditions. Where this rule is not observed, the risk of larger scale failures increases rapidly.<sup>9</sup> While programmatic size is important for significant impacts, so is the intelligent phasing of implementation. Third, each of the methodologies highlighted (save RRA/PRA, which, as noted, often suffers from quality concerns in their field application) are tied to significant training programs – for example, FFS field training takes place over an entire growing season (or longer, in the case of plantains), and the introduction of PVS methodologies was accomplished through a multi-year training and support program. In the case of Ghana's FFS program, there are also important ties to a parallel program of providing extension agents with tertiary university education (e.g. Zinnah and Naibakelao, 1999) that deserve greater attention on the part of donors.

### **1.2.2 Technology Transfer (TT)**

As defined previously, TT is used here to describe the movement of knowledge or technologies across contexts -- inter-regional, intra-regional or organizational. Despite the deserved criticism that ill-conceived TT efforts have received in the past, it is important to note that, other than instances where technologies have been developed within a single organization, all other innovations that have been adopted by farmers within the sub-region involve some form of TT. Used intelligently, TT represents the greatest mechanism to stimulate and sustain rapid agricultural development within the region. This includes the transfer of farmers' indigenous knowledge and perceptions into the region's institutions of research and dissemination, which over the past 10-15 years has proven to be one of the most important sources of technical innovations, particularly in the area of natural resource management (e.g. Simpson, 1999). While many of the important examples of TT are tied to the on-going work of agricultural research organizations, and are not addressed here, several involve specific ties to technology dissemination efforts. Two of the most important include:

- a. CGIAR Centers. WARDA and IITA, which are based in the sub-region, and ICRAF, which also has a presence in the sub-region, have permanent technology transfer specialists on staff, and operate a number of dedicated TT projects (the other CG centers working in the region, ICRISAT and ILRI, apparently do not have TT staff in place). The importance of having staff dedicated to transforming research results into usable technologies and making these available to dissemination agencies, cannot be over emphasized. In addition, both WARDA and IITA facilitate regional and sub-regional networks that serve to assist and partner with national and NGO technology dissemination programs (e.g., ROCARIZ's Technology Transfer Task Force, INGER-Africa, which

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<sup>9</sup> Discussed in the contrasting experiences of Ghana and Mali's FFS programs (Simpson and Owen, 2002).

disseminates rice germplasm throughout Africa). The tying of small operational grants and training opportunities to the ROCARIZ network has been highly successful in keeping different member groups actively involved in regionally coordinated activities.<sup>10</sup> In response to the unique opportunity of the once-in-a-generation technical breakthrough presented by the NERICA rice varieties, WARDA has launched a special standalone effort, the Africa Rice Initiative, to help rapidly move these varieties throughout the region;

- b. Larger NGOs and Projects. Through their home office technical staff, and hired program officers, the larger NGOs and donor funded projects essentially constitute separate (independent) technology transfer systems, with the ability to extrapolate experiences and cross-fertilize successes from different project sites and countries. In a number of instances, these organizations and projects have proven to be important contributors in the introduction and movement of new technologies across the sub-region. CARE's work in refining the indigenous practice of using rock lines to control soil erosion and promote greater moisture infiltration in Burkina Faso, and its subsequent spread to neighboring countries, is one of many such examples.

In contrast, the record of the private sector's contributions to recent agricultural developments in the sub-region is rather thin. On the one hand, private companies are without doubt the most important providers of basic input materials (e.g. tillage equipment, fertilizers, pesticides, veterinary supplies and formulated animal supplements). However, many of these inputs have not changed appreciably in decades. In those areas where private companies have attempted to become commercially involved in introducing innovations, the record is uneven. The few private seed companies found in the sub-region have found gaining market share difficult, due largely to the characteristics of the major crops (non-hybridized) and the diffuse, often-poor, potential client populations. Foreign agro-chemical companies are increasingly fighting battles on many fronts as they collide headlong with governmental and NGO efforts to safeguard farmers' health, increase profits and reduce environmental damage. In other cases, targeted assistance that involves partnership between public agencies, private entrepreneurs and other actors has helped commercial businesses to become successful purveyors of new technologies, as in the case of local equipment manufacturers producing the ASI rice thresher-cleaner, based upon a modified design from IRRI.

There are several lessons that can be drawn from these examples. First, recent developments by key CGIAR centers within the region have achieved a certain amount of success in helping to bridge the gray area between research and extension. Increasing the number of dedicated TT staff positions, effective networking structures, and the initiation of highly-targeted technology promotion initiatives (e.g., Africa Rice Initiative -- ARI)<sup>11</sup> are all promising areas of future investment. Second, the larger NGOs and project-based initiatives constitute additional, and potentially rich, sources of technological innovation and adaptation. However, due to their independent status, different approaches will need to be employed to gain access to and integrate with their considerable resources. Third, for the foreseeable future, placing greater reliance on the private sector and market forces to

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<sup>10</sup> Although not yet established, the promising results of the ROCAFRAMI pilot effort (Ouendeba et al., 2002) deserve close consideration by donors.

<sup>11</sup> The Africa Rice Initiative is a WARDA-led for the rapid and broad-based diffusion of NERICA varieties throughout Africa with initial funding from the Government of Japan, UNDP, Rockefeller Foundation and World Bank (<http://www.warda.cgiar.org/warda1/main/Partnerships/ARI.htm>).

drive the process of technology innovation, transfer and dissemination would probably significantly slow, rather than accelerate, agricultural development within the sub-region, and would likely undesirably skew the type of innovations offered, as well as the access to new technologies based on economic and geographic considerations. More than a decade has passed since the first serious announcements about the coming biotech revolution were issued, and still no major improvements have been delivered. While greater private sector involvement can be achieved, special emphasis will likely need to be placed on establishing the appropriate context and helping fledgling businesses to pick up new technologies and expand their technology dissemination roles.

### **1.2.3 General Recommendations**

Based upon the preceding discussions of major issues, current approaches and lessons learned, several general recommendations can be made for enhancing the identification and movement of technological innovations within the sub-region. These include:

- Taking an aggressive stance on filling key knowledge gaps, the results of which would feed into immediate and longer-term investment planning decisions. Gaps of particular concern include (i) gaining a regional understanding of NGOs and other technology providers' activities, capacities, sources of innovation and the best ways of gaining access and mobilizing their resources, and (ii) the current status and capacities of the region's agricultural universities to train the next generation of agricultural professionals, particularly in the areas of extension education, commodity research and agricultural business training and support;
- Assessing different options for new ways of meeting the critical need for improved access to innovations (e.g. university-managed technology outreach centers, along the lines of the USAID supported PEARL project in Rwanda (Partnership to Enhance Agriculture in Rwanda through Linkages), ATTRA-type<sup>12</sup> information hubs, and increased use of rural radio opportunities); assessing ways of assisting general and targeted efforts to accelerate technology diffusion and transfer (regional 'dare to share' technology fairs; success story study tours and exchange visits; support for ARI-type initiatives to rapidly expand access to technologies with immediate and exceptional promise);
- Discussing with IARC and NARS partners ways of improving regional TT and dissemination capacities through strengthening the existing sub-regional commodity networks, and the regionally-based CG centers (e.g., funding additional TT positions, providing additional operational funds to selected TT networks). The major importance of improving regional access to new genetic material warrants specific attention. Issues to consider include ways of streamlining release systems, the comparative advantages and requirement of alternative dissemination approaches, ways of supporting the development of private sector seed companies, gene bank security, and regional preparedness for post conflict/disaster response measures, among others;

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<sup>12</sup> Appropriate Technology for Rural Areas (ATTRA) is a USDA funded program managed by the National Center for Appropriate Technology serving the information needs of all US farmers on issues related to sustainable agriculture (<http://attra.ncat.org/>).

- Assessing WARP's S&T staffing needs in order to establish an in-house capacity to rapidly identify and respond to emerging regional opportunities, and track key developments.

## 2. Investment Options

The proposed investment options described below for building stronger technology transfer and dissemination (TTD) capacity within the sub-region provide suggestions and guidelines for the six-year period from 2003 to 2008. In general, the actionable items are sequential in nature, intended first to establish the basic understanding and shared vision for WARP and key partners necessary to move forth with more detailed and long-ranging initiatives. It is recognized, and in fact fully expected, that the ultimate longer-term investment decisions taken will evolve significantly from what is suggested here, due to many reasons. As a starting point, however, the following propositions represent an initial 'best bet' assessment of critical leverage points where WARP should focus its attention. The presentation of investment options is organized around two timeframes: *Short Term*, covering the remainder of 2003-04, primarily oriented towards establishing the platform for WARP's long-term TTD investments within the sub-region; and *Medium Term*, covering the remainder of the planning period, and comprising major investment actions that are largely conditional on the outcomes of the short term actions.

### 2.1 Short-Term Investments

#### 2.1.1 Closing the Knowledge Gaps on Agricultural Technology Diffusion and Regional TTD Education Programs.

Closing the knowledge gap on the specific activities, resources and networks of technology diffusion programs, and establishing a benchmark on the current status of the (few) TTD education programs within the sub-region will be absolutely critical to WARP in formulating an informed agenda for strengthening the major areas of weakness in TTD within the sub-region.

- **Implementation:** The existing NGO and Producer Association Inventory, created and partially populated with data from the 9 CILSS countries in 2002, would be the obvious starting place. As a first step, it will be necessary to review and assess the adequacy of the information already collected, and suggest possible additions, such as identifying the 'sources' of technologies being disseminated in various extension programs, which is not currently part of the database. Secondly, an implementation plan will need to be established for expanding the coverage of those countries already represented in the database, and for the inclusion of the remaining, non-CILSS countries within the sub-region. Finally, a summary report on the findings of the survey would need to be generated, including interpretive recommendations of next steps. One possibility would be for holding a sub-regional workshop of key NGOs and other stakeholders involved in technology diffusion, including donors, to review the findings of the study and to discuss and map out a set of follow-on activities. Because the structure of the database and major data collection instruments are already established, additional investment would have a high marginal rate of return in supporting further data collection and analysis. Time requirements would be roughly 4 months: one month to analyze and review data currently in the database, make modifications to the collection instruments, and draft plans for further data collection; two months for additional data collection and entry into the database; one month to finalize data entry and cleaning, data analysis

and final report preparation. The potential of linking the Technology Diffusion Stakeholder workshop with other planned activities would greatly reduce costs. The review of TTD education programs within the region would best be structured around a small-team scoping mission, involving at least two technical experts -- one in the area of agricultural education program design and evaluation, and the second a TTD specialist. Both should be familiar with the sub-region. The team should focus on assessing the content of the existing education programs and their adequacy for meeting the immediate and long-term professional needs of graduates, the degree of linkage between the education system and front-line extension agencies and other TTD stakeholders, among other issues. Those conducting the study should establish early contact with the FAO Regional Program Officer for Agricultural Education and Extension, based in Accra, in order to identify the specific countries/programs to target. Such a review should be completed within a time period of roughly 60 days, including the preparation of recommendations for next step activities. The possibility of reviewing the results of this assessment at the same time as those of the NGO study (ideally within the context of a large, sub-regional stakeholders' workshop) should seriously be considered. Because the nature of the recommendations from this study are likely to involve proposals for significant, long-term, capacity-building initiatives, the inclusion of representatives from appropriate donor organizations will be critical. Establishing initial contact with these organizations might be part of the terms of reference of the study team members.

- **Anticipated Returns.** Although by themselves largely intangible, the knowledge gained from these assessments would be invaluable in terms of providing WARP with the basis for making informed decisions about critical issues impeding enhanced TTD within the sub-region. Without a clear idea of what exactly is occurring within the NGO community, or the status of education programs preparing the next generation(s) of agricultural professional and entrepreneurs, it will be difficult, if not impossible, for WARP to correctly position itself to take meaningful steps towards achieving goals of the IEHA in a sustainable manner. Returns to this investment could be easily tracked by matching any, and all, follow-on activities that result from the recommendations emerging from these studies and workshop. Establishing further linkage between these studies and the outcomes of any/all follow-on activities is possible, but perhaps not necessary, unless WARP is particularly interested in assessing the returns to investments on basic knowledge-gathering assessments.
- **Risk Factors:** There are no immediate risks associated with this particular activity. In general, however, any major investments to human capital formation and institutional strengthening, which might come out of these assessments, are vulnerable to national-scale conflicts and more individually-born risks (such as HIV/AIDs). While conflict mediation is beyond the scope of WARP's mandate, there are ways of tying in HIV/AIDS education programs to the advanced training of TTD professional staff, which might reduce the impacts of this new source of 'brain drain.'

### **2.1.2 Assessing 'Best Bet' Improvements to Existing TTD Mechanisms within the sub-Region.**

There are a number of well-established, as well as newly emerging, mechanisms involved, in whole or in part, in TTD activities within the sub-region. These include the commodity or special problem networks, and the activities of the major IARC centers based, or active, within the region. While these mechanisms exist, they often suffer from resource constraints, financial or human, that greatly limit their intended contributions. The addition of well-targeted, sometimes very modest, additional

support has the high potential of greatly improving their effectiveness, while avoiding the expense and delays of creating entirely new initiatives from the ground-up.

- **Implementation.** Convene a meeting of representatives from key TTD mechanisms, and representative beneficiaries, from within the sub-region to discuss and identify key constraints that prevent their respective vehicles from having greater impact (e.g. operational funds in the form of small or matching grants for NARS partners, key staffing or support positions). Consideration should also be given to including representatives from such organizations as ICRISAT and ILRI, who apparently do not have TTD personnel within the sub-region, but perhaps should. As a follow-on from the meeting, participants should be charged with drafting proposals, sanctioned by their organizations, to alleviate these constraints, which WARP can then review for further action. The possibility of holding this meeting in conjunction with those discussed under 1) should be considered in order to reduce costs, and increase opportunities for synergism. Funding of the proposed activities could be managed through a dedicated ‘slice’ of a revised TARGET-type program, and/or via independently managed grants.
- **Anticipated Returns.** A clear set of investment options that reflect the real and immediate needs of existing TTD vehicles operating within the sub-region. The monitoring of impacts will need to follow the same sort of temporal tracking suggested under 1) above, although would be augmented by reporting requirements of the grant recipients.
- **Risk Factors.** No immediate perceived risks.

### **2.1.3 Assessing ‘Best Bet’ Alternatives for Establishing New TTD Mechanisms within the sub-Region.**

In addition to the established vehicles for assisting TTD within the sub-region, discussed under 2), there is a potentially larger pool of new investment opportunities that warrant close consideration, based upon their proven success in other areas of Africa and beyond. These include, but are by no means limited to:

- holding sub-regional, or country-cluster, ‘Dare to Share’ innovation fairs (used in Eastern and Southern Africa and Europe);
- ‘success story’ study visits or exchanges (featuring examples such as Ghana’s TTD Tertiary Education Program, or one of the established Farmer Field School programs);
- opening of Innovation Outreach Centers attached to Universities (such as in the successful USAID-funded PEARL project in Rwanda);
- making greater use of regional Rural Radio Networks that are now operating in many countries in the sub-region;
- establishing an NCAT/ATTRA-type technical information center that would serve as the enduring technical information repository for the sub-region which is currently lacking (either as an independent body, or through one of the CGIAR centers based in the region);
- creating a new regional program along the lines of the ROCAFRAMI proposal to assist producer associations in capturing more of the benefits of increased market integration;
- and others.
- **Implementation.** To lay the ground work for this activity, WARP would be well advised to commission a concept paper, outlining the range options from around Africa and the world, and to make time for interacting extensively with the paper’s author and perhaps a limited number of other practitioners. In addition, it would be very useful for WARP staff to visit some of the

innovative program sites to get a better sense of their scale and potential. The best funding vehicle for this type of initiative might be through a TTD competitive grants mechanism, such as a revised TARGET II program, although perhaps some of the funding options may best be pursued through standalone initiatives. Key options identified through the commissioned paper could be used to help orient the proposal submissions. In designing such an initiative, WARP should consider the potential overlap, or separation, with other USAID mechanisms (e.g., RAISE Plus) so that the maximum level of flexibility and synergism is achieved. If INSAH is to be involved in the proposal review process, it would be advisable that they also participate fully in the preparatory site visits and commissioned paper review to ensure that they have a shared understanding and vision of flavor and intent of the grant competition. While this activity can be started quickly, it would best if it followed completion of the NGO and TTD Education studies described under 1) in order to capitalize on their lessons in defining key funding objectives and specific targets.

- **Anticipated Returns.** Returns will depend entirely on the nature of what activities are funded. The procedures for tracking and evaluating the impact of each grant should be included in the proposal guidelines.
- **Risk Factors.** None that can immediately be identified; however, it would be advisable that the grant review panel includes an assessment of potential risk factors in their consideration of the proposals.

#### **2.1.4 Holding a sub-Regional Seed System Summit.**<sup>13</sup>

Holding a focused sub-Regional Seed System Summit would be the most effective way of dealing with the wide range of common issues affecting the region's seed systems. Key issues include identifying ways of restructuring dis-functional national variety release mechanisms that can delay the approval for release of new genetic material for years, as well as exploring alternatives to centralized multiplication and dissemination structures that typically add an additional 5-7 years onto the time it takes for released varieties to become available to farmers. Additional issues, such as the sub-region's preparedness for conflict and disaster recovery, gene bank security, and the harmonization of regulations governing experimentation and commercialization of GMOs also require discussion.

- **Implementation.** A regional Summit of this nature will need to be very carefully planned with close coordination with other partners (e.g. FAO, IITA IPGRI, ISNAR, WARDA) and key national policy-makers. To be successful, it will be essential that several centerpiece reports be commissioned involving summaries of the current status and recent performance of the region's national seed release and multiplication programs, achievement of alternative dissemination approaches (including community-based efforts and private seed companies), and a review of the existing frameworks on material transfer, IPR and GMOs. Due to the importance of adequate

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<sup>13</sup> In light of the importance of the issue, and the growing body of program-level experience, WARP may want to consider holding a similar, though structurally different, sub-regional meeting to review alternative extension financing-delivery mechanisms, which could be linked to follow-on WARP funded, or Mission-supported, pilot programs.



- preparations for the success of such a summit, the meeting should probably be targeted for no earlier than the beginning of 2004.
- **Anticipated Returns.** The potential returns are enormous. Policy changes allowing faster, more open access to new varieties by farmers and TTD organizations across the sub-region will be a necessary ingredient in creating the environment for rapid national agricultural growth envisioned by IEHA. The best way of tracking immediate impact will be through monitoring 1) the specific reforms and additional developments undertaken on a country-by-country basis as a result of the summit (which will make investments in establishing a benchmark of current status, as suggest above, essential), and 2) a periodic monitoring of how many new varieties are approved for release and their subsequent multiplication and dissemination through various channels following specific policy reforms. While 2) will provide the major share of relative details necessary for quantifying actual impact, such a monitoring process (or periodic reports) will be costly and time consuming. WARP will need to assess the various pros and cons of quantifying returns to an investment of this nature.
  - **Risk Factors.** Again, there are no immediate risk factors associated with this activity, although long-term security and related risk issues should be included in the summit discussions (e.g. recent events in Côte d'Ivoire, and WARDA's successful rescue of a large share of its germplasm from long-term storage, could easily have turned out differently; the immediate and long-term consequences would have been nothing short of catastrophic).

#### **2.1.5 Assessing WARP in-House S&T and TTD Capacities and Needs.**

To capitalize on its potentials for making significant contributions to regional agricultural growth and development, WARP will need to ensure that it has the in-house S&T and TTD capacity to flexibly initiate, coordinate and track its priority investments. While immediate needs may not be high, the potential funding levels of IEHA and other mechanisms are such that an anticipation of future needs should drive the process.

- **Implementation.** To get the most out of such an exercise, it would be advisable to utilize the services of a highly qualified outside facilitator (contact with the CGIAR Organizational Change Program would be useful in identifying suitable candidates). Minimum costs would be limited to investment of staff time, and implementation could be fit into the agencies' operational plans. While this activity will not lead to any immediate activities, it is an essential investment that must be made in order to prepare WARP for taking an active role in the priority areas of the IEHA.
- **Anticipated Returns.** This can only be assessed in terms of the impact on WARP's ability to track and respond to current and changing needs within the region.
- **Risk Factors.** None, other than those already faced by current WARP staff.

## **2.2 Medium-Term Investments**

This section provides illustrative examples of potential areas of medium-term TTD enhancing investments within the sub-region. As noted in the introduction to this section, the priority issues listed here are largely structured around the anticipated outcomes and findings obtained through the more immediate investment option outlined above. Without the benefit of the knowledge gained

through such first steps, it is difficult (inappropriate) to outline options with a high level of actionable detail.

### **2.2.1 Strengthening West Africa's TTD Educational Institutions and Human Capital Development.**

Depending on the findings of the Educational Status assessment, suggested above under A.1., the major medium-term investment area for the sub-region may prove to be a targeted strategy for strengthening the primary educational institutions that are preparing the next generation of agricultural professionals and entrepreneurs. Although the investment in educational institution strengthening has fallen from the list of donor priorities, every serious assessment (including USAID's own) of the necessary elements for stimulating agricultural growth and economic development in Africa highlights the need for a return to the funding of advanced education and institutional strengthening initiatives. Options to be considered include:

- funding advanced degrees at US institutions of higher education;
  - upgrading selected universities into regional centers of excellence;
  - development of country-based institutional strengthening strategies;
  - a temporal, and sequential, integration of all three.
- **Implementation.** Work in this area should be based on a strategic, highly focused effort to strengthen one or two key institutions (located in a Francophone and Anglophone country). Due to the cost and timeframe for this type of investment, it will be critical to mobilize and coordinate the resources of several major donors.
  - **Anticipated Returns.** Nothing short of establishing the sub-regional capacity for countries to develop and pursue their own paths of national economic development.
  - **Risk Factors.** Acute risk factors include the potential fallout from ill-prepared donor exit strategies, and the chance that armed conflict and/or loss of human capital through individually-based threats such as HIV/AIDS may erase hard won gains. Mitigation measures for these threats are few. Much larger risks, however, are associated with doing nothing. Given the significant levels of investment being targeted at the sub-region through various mechanisms over the next 15 years, and the consensus view that knowledge-based, skill-dependant, free-market agricultural developments will play a leading role in sustaining national economic growth, the overall costs associated with stalled, or failed, efforts due to the lack of an educated and trained human resource base are massive in comparison. This is perhaps the most serious risk factor confronting the longer-term development goals of IEHA, and mitigating measures (such as those described here) should be built into planning efforts from the outset.

### **2.2.2 Initiation of a modified TARGET II Grants Program.**

Assuming positive results flow from the initial activities outlined under 1.B. and C. above (and there is every reason to assume that they will be positive), a funding mechanism will need to be established to respond to identified sub-regional TTD opportunities. Based on the experience with the TARGET program structure, initiating a 'TARGET II' program may be the most expedient means of doing so.

- **Implementation.** A strategic decision will need to be made whether to combine the investment options outlined under 1B and C, or to establish separate grant-making mechanisms. There are

pros and cons to each. If the combined option is selected, it will be important to partition the grant envelope such that there are reserved portions for each -- the support of broadening the impact of existing mechanisms, and investments in innovative, cutting-edge TTD vehicles.

- **Anticipated Returns.** The returns to improved regional TTD will be based on the specific profile of the individual grants made, which can be monitored through the reporting requirements of the grants, and possibly augmented by an end-of-program assessment.
- **Risk Factors.** Impossible to predict *a priori*. Basic risk assessment questions should be included as part of the grant evaluation process. However, as an operating principle, a much higher risk threshold should be established for grants pursuing innovative, cutting-edge vehicles for TTD than is set for those strengthening established TTD mechanisms.

### **2.2.3 Seed System Initiatives.**

Although difficult to predict, the holding of a Seed System Summit, outlined above, will likely lead to the identification of a number of follow-on activities that may require WARP's assistance over the medium-term. These range from policy-level reforms and harmonization, to support of specific alternative seed diffusion mechanisms and targeted support for developing the capacity of private seed companies.

- **Implementation.** This will depend on the specific activities to be supported.
- **Anticipated Returns.** Without identified programmatic activities, projected returns are impossible to foresee.
- **Risk Factors.** No identifiable risks, although the issues associated with potential adverse effects (human and environmental) associated with GMO technologies should be an issue that WARP keeps at the center of its attention in exploring seed system-related issues.

### **2.2.4 ARI-type Initiatives.**

Every scientist and major research organization has the dream of producing results that will have major, widespread development impact. Such results, although not common, do arise. The current example of the NERICA varieties developed at WARDA, and support for their widespread dissemination through the African Rice Initiative and NERICA Network, perhaps typifies this experience. By definition, the potential pay-off for these new technologies is vast, although impossible to foresee or to produce on command. Whether through added support to the current ARI efforts, or future developments, WARP should establish the flexibility and capacity to identify and respond to these types of opportunities as part of its IEHA strategic planning.

- **Implementation.** This will depend entirely on the type(s) of opportunities that arise. In general, however, in order for WARP to identify and respond to such opportunities, there will need to be sufficient in-house S&T and TTD capacity within the WARP office, including regular, personal contact with the major research institutions within the sub-region. Investments of this type will likely involve multiple donors, which in turn suggests that WARP should establish a regular

(annual) set of meetings among the principle S&T and TTD donors active within the sub-region in order to coordinate efforts.

- Anticipated Returns. Impossible to predict, although the effective trigger for this type of investment should be significant, fairly immediate and widespread impact.
- Risk Factors. Cannot be assessed.

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